DECISION	TRUTH: H_0 true	TRUTH: H_0 false
reject H_0	Type I Error α *more serious	correct Power
fail to reject H_0	correct	Type II Error β

$P(\text{type II error}) = \beta$

Type I error = reject H_0 when H_0 is true
*more serious
Ex: religion, business

$P(\text{type I error}) = \alpha$ (0.05, 0.01)

Type II error = Fail to reject H_0 when H_0 is false
*less serious

Power = reject H_0 when H_0 is false

an alternative μ is true

Power = $1 - \beta$

1 → good

β → error = bad

* Power is considered good enough when > 80%.

$H_0: \mu = 10$

$H_a: \mu > 10$

$n = 100$

$\sigma = 3$

$\alpha = 0.04$

$\mu_A = 15$

power = 0.84

Ex 1

a) $H_0: \mu = 8$ $\quad \bar{x}_A = 8.15$ $\quad n = 25$
$H_a: \mu > 8$ $\quad \alpha = 0.05$ $\quad \sigma = 0.16$

b) yes, b/c power > 80%

c) $\alpha = 0.05$

d) $\beta \approx 0.155$

e) $\uparrow n$

① Increase n
- more data = more info about pop (μ)
& whether or not its changed

② Increase α
— larger chance of rejecting H_0

③ decrease σ (can't actually do)
- smaller spead / less variable
⇒ more info/accuracy about what μ is.

④ Consider an alternative (μ_A) further from claim (μ_0)
Ex: wt. gain

Ex 2

a)

b) No, b/c power < 80%

c) $\alpha = 0.01$

d) $\beta = 0.342$

e) $H_0: \mu = 0.86$ $\mu_A = 0.845$

decrease

f) increase

g) decrease

h) increase

wksht

(1) a) $H_0: \mu = 22{,}000$

$H_a: \mu < 22{,}000$

$\alpha = 0.05$ $\bar{x} = 21{,}819$

$n = 100$ $\sigma = 1{,}295$

$\mu_A = 21{,}500$

b) yes, power > 80%

c) $\alpha = 0.05$

d) $\beta = 0.023$

e) decrease

2) a) $H_0: \mu = 84.3$ $n = 45$ $\bar{x} = 87.8$ $\alpha = 0.01$

$H_a: \mu > 84.3$ $\sigma = 8.6$ $\mu_A = 87.3$

b) no, power < 80%

c) $\alpha = 0.01$

d) $\beta = 0.27$

e) decrease